

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A vertical heat treatment system comprising:
 - a heat treatment furnace having a furnace throat in a lower part thereof;
 - a lid that hermetically closes the furnace throat;
 - a holder, disposed on the lid, that holds a plurality of process objects at vertical intervals via ring-shaped support plates;
 - an elevating mechanism that moves the lid vertically to load and unload the holder into and from the heat treatment furnace; and
 - a transfer mechanism that transfers process objects between the holder and a container holding therein a plurality of process objects at intervals, the transfer mechanism including:
 - a plurality of substrate support devices spaced at intervals, each substrate support device having front and rear seats fixedly provided on a lower surface of the substrate support device for respectively receiving front and rear edge portions of an upper surface of a process object, the front seat having an inclined surface directed obliquely downward and the rear seat having an inclined surface directed obliquely downward; and
 - gripping mechanisms, each-gripping mechanism being configured to grip a process object on an under side of an associated one of the-substrate support devices, each of the gripping mechanisms having a fixed engagement member fixedly provided on a distal end of its associated substrate support device to engage with a front edge portion of a process object, and a movable engagement member movably attached to a proximal end of its associated substrate support device to be disengageably engaged with a rear edge portion of the process object, the fixed engagement member having an inclined surface directed obliquely upward to support a front edge portion of a lower surface of the process object, and the movable engagement

member having an inclined surface directed obliquely upward to support a rear edge portion of the lower surface of the process object, whereby[.]]

an angle of inclination of the inclined surface of the front seat with respect to a horizontal plane is smaller than an angle of inclination of the inclined surface of the fixed engagement member with respect to said horizontal plane,

an angle of inclination of the inclined surface of the rear seat with respect to said horizontal plane is smaller than an angle of inclination of the inclined surface of the movable engagement member with respect to said horizontal plane, and

when the movable engagement member moves forward relative to its associated substrate support device to approach the fixed engagement member and grip the process object, the front edge portion of the process object is held by the inclined surface of the front seat and the inclined surface of the fixed engagement member, while the rear edge portion of the process object is held by the inclined surface of the rear seat and the inclined surface of the movable engagement member, so that a gap is formed between a lower surface of the associated substrate support device and an upper surface of the process object.

2. (Canceled)

3. (Original) The vertical heat treatment system according to claim 1, wherein each of the ring-shaped support plates has cutouts for preventing the ring-shaped support plate from colliding with the fixed engagement member and the movable engagement member.

4. (Previously Presented) The vertical heat treatment system according to claim 1, wherein at least one of the substrate support devices is provided with a mapping sensor, which is configured to detect a position of a detection object by moving said at least one substrate support device such that a light beam traveling between two distal ends of the said at least one substrate support device is interrupted by the detection object.

5. (Original) The vertical heat treatment system according to claim 1, wherein the fixed engagement member and the movable engagement member are formed of a heat-resistant resin.

6. (Currently Amended) A method of transferring process objects in a vertical heat treatment system including:

- a heat treatment furnace having a furnace throat in a lower part thereof;
- a lid that hermetically closes the furnace throat;
- a holder, provided on the lid, that holds a plurality of process objects at vertical intervals via ring-shaped support plates;
- an elevating mechanism that moves the lid vertically to load and unload the holder into and from the heat treatment furnace; and
- a transfer mechanism that transfers process objects between the holder and a container holding therein a plurality of process objects at intervals, the transfer mechanism including:
 - a plurality of substrate support devices spaced at intervals, each substrate support device having front and rear seats fixedly provided on a lower surface of the substrate support device for respectively receiving front and rear edge portions of an upper surface of a process object, the front seat having an inclined surface directed obliquely downward and the rear seat having an inclined surface directed obliquely downward; and
 - gripping mechanisms configured to grip a process object on an under side of an associated one of the substrate support devices, each of the gripping mechanisms having a fixed engagement member fixedly provided on a distal end of its associated substrate support device to engage with a front edge portion of a process object, and a movable engagement member movably attached to a proximal end of its associated substrate support device to be disengageably engaged with a rear edge portion of the process object, the fixed engagement member having an inclined surface directed obliquely upward to support a front edge portion of a lower surface of the process object, and the movable engagement member having an inclined surface directed obliquely upward to support a rear edge portion of the lower surface of the process object, whereby

an angle of inclination of the inclined surface of the front seat with respect to a horizontal plane is smaller than an angle of inclination of the inclined surface of the fixed engagement member with respect to said horizontal plane,

an angle of inclination of the inclined surface of the rear seat with respect to said horizontal plane is smaller than an angle of inclination of the inclined surface of the movable engagement member with respect to said horizontal plane, and

wherein said method includes the steps of:

placing each of the substrate support devices above a respective process object that is positioned in a transfer start position;

moving the movable engagement the fixed engagement member to grip the process object, so that the front edge portion of the process object is held by the inclined surface of the front seat and the inclined surface of the fixed engagement member, while the rear edge portion of the process object is held by the inclined surface of the rear seat and the inclined surface of the movable engagement member, so that a gap is formed between a lower surface of the associated substrate support device and an upper surface of the process object;

moving the substrate support device that is gripping the process object to a position above a transfer target position; and

moving the movable engagement member away from the fixed engagement member to release the process object whereby the process object is mounted on the transfer target position.